

Postharvest Handling

Sorting

- ▶ Separating the different types of fruits from fruit lot is called sorting.
- ▶ It depends on-
 1. **Damage product:** Damaged product should be avoided. It should be separated from fruit lot and well mature product should taken.
 2. **Diseases:** Diseased free fruit and vegetable should be collected from a lot. It is very important for sorting.
 3. **Insect cutting products:** Insect cutting fruit must be avoided because consumer want good fruit.
 4. **Maturing:** Mature fruit is very tasty. So maturity is very much needed for fruit.
 5. **Color:** Colours should be lightable. Well coloured fruit should be selected that attract consumer. Colour also indicates the maturity level of seed.
 6. **Shape:** In case of packaging, shape is essential. Some type of fruit should be selected for packaging in case of sorting.
 7. **Size:** Size also an important matter for sorting fruits from a fruit lot. We should selected same size of fruit.

Grading

Grading of fruits and vegetables after harvesting is an essential step in post-harvest management. Grading of fruits and vegetables on the basis of physical characteristics like weight, size, colour, shape, specific gravity, and freedom from diseases depending upon agroclimatic conditions. The known methods of grading of fruits and vegetables are manual grading, size grading.

Grading of fruits and vegetables in the fresh form for quality is essential, as the people are becoming quality conscious day by day. Further, upon arrival of fruits and vegetables at the processing centres, they should be graded strictly for quality. The immature, properly mature and over mature fruits and vegetable should be sorted out for the best attributes.

Definition of Grading

Grading is sorting of vegetables and fruits into different grades according to the size, shape, colour, and volume to fetch high price in market.

Or, Arrangement of fruits into different groups by separating from a fruit lot is called grading.

Grading depends on

- Cultivar
- Size
- Appearance
- Colour
- Quality

Objectives

1. To get higher price.
2. To have different marketing value.
3. To adjust with world market.
4. To facilitate marketing.
5. To facilitate packing.
6. To facilitate transporting.
7. To increase the shelf life.

For International market, 3 general grades are considered as:

1. Extra class.
2. Class I.
3. Class II.

1. Extra Class: The extra class is of superior quality possesses the shapes and colour of the variety and without internal defect likely to affect the inherent texture and flavour. A 5% tolerance is allowed for errors. It must be carefully presented taking into account the uniformity of the produce in size colour, condition arrangement of the produce in the package quality and appearances of the packing or pre-packing material.

2. Class I: Almost having a same quality is like the Extra Class except that a 10% tolerance is allowed. Individual fruit is allowed a slight defect in shape, colour and minor skin defect which do not affect the general appearance for keeping qualities. In packing the size range may be wider and product need not always be arranged in the package.

3. Class II: This class product may exhibit some external or internal defects provided they are fit for consumption while fresh. This class is best fitted for local or short distance market. This category will satisfy the needs of customers who are not too demanding and for whom price is more important than quality.

Advantages of Grading

1. Losses the selling price due to presence of substandard products or specimen can be easily avoided.
2. It increased marketing efficiency by facilitating buying and selling a produce without personal selection.
3. Grading enhanced to set good price for graded products.
4. Heavy marketing cost in packing and transportation can be avoided by grading.
5. In grading, diseased and defected specimen are not damaged due to contact of diseased specimens and thus gets high price in market.
6. By grading, there is fairness to both Buyers and Sellers.
7. Properly graded vegetables and fruits are purchased by the consumer easily without inspection.

Grading of Fruits

Generally, the fruits are graded on the basis of size, weight, specific gravity, colour, variety, etc. Size grading is predominantly followed in almost all types of fruits on the basis of size. The fruits are graded as a small, medium, large and extra large. On the basis of maturity, the fruits are graded as immature, properly mature and over mature. Grading on the basis of maturity decides both quality and shelf life. The *Alphonso* and *Pairi* mango fruits are graded on the basis of weight as less than 200g, 200-249g, 250-299g, 300-349g and more than 350g. Out of these grades the weight grade 250-299g account for about 30% of the fruits. The mango fruits are also graded on the basis of Sp. gravity (3 grades on the basis of sp. Gravity as less than 1.0 sp.gr, 1.0-1.02 and more than 1.02). The sp.gr Grade 1.0-1.02 accounts for about 50% of the *Alphonso* and *Pairi* mango fruits.

Grading of Vegetables

The fruit vegetables such as bitter gourd, okra, bell pepper, brinjal, green chilli etc. also graded on the basis of size into 3 grades as small, medium and large. The vegetables like tomato are graded on the basis of colour.

Packaging

Preparation of product or commodity for proper storage and/or transportation.

Or, Packaging is the technology of enclosing or protecting products for distribution, storage, sale, and use.

Packaging is an important consideration in vegetable and fruit market. The use of properly designed containers for transporting and marketing of vegetables can significantly reduce their losses and maintain their freshness succulence and quality for longer period. Packaging also provides protection from mechanical damage and undesirable physiological changes and pathological deterioration during storage, transportation and marketing.

Many vegetables are transported in gunny bags of bamboo baskets. Packaging material such as polythene films, paper boards and boxes lined with polythene and other materials can effectively prolong the shelf life of vegetables. By using plastic films, vegetables can be protected from dry air. Polythene packaging, provides modified atmosphere and consequently reduces decay, softening and loss of solids. The thickness and permeability to CO₂, O₂ and water vapour of films needs to be standardized for each vegetable.

Example: In case of Brinjal and Cauliflower, thick films were found to develop off-flavour whereas thin and gas permeable films maintained Cauliflower for longer period and Okra fruits could last for nine days without deterioration and quality.

Packaging of vegetables in perforated films significantly reduces weight and water loss in transportation. Ex. Carrot.

Wide variety of containers such as Wooden boxes, baskets woven from bamboo or trees, hessian sack, earthen pots and Corrugated Fibre Board (CFB) boxes are important package forms used in transportation and distribution of fruits in most of the developing countries.

All the package must have some amount of ventilation in order to prevent physiological break down, the wooden boxes have a good stacking strength but they are heavy in weight.

Corrugated Fibre Board are made from the craft paper which can easily be manufactured from Bamboo, grasses and various types of agricultural residues as well as by recycling the used Card Boards or Papers.

Objectives

Physical protection: Since the objects enclosed in the package may require protection from among other things, mechanical shock, vibration, electrostatic discharge, compression, temperature, etc. packaging is important.

Barrier protection: A barrier to oxygen, water vapor, dust, etc. is often required. Permeation is a critical factor in design. Some packages contain desiccants or oxygen absorbers to help extend shelf life. Modified atmospheres or controlled atmospheres are also maintained in some food packages. Keeping the contents clean, fresh, sterile and safe for the duration of the intended shelf life is a primary function.

Shortage and usage: Packaging also facilitates the storage and use of products. Thus packages may be so designed as to conduce to the ease of handling by consumers and by members of the channel of distribution.

Convenience: Packages can have features that add convenience in distribution, handling, stacking, display, sale, opening, reclosing, using, dispensing, reusing, recycling and ease of disposal.

Functions

- To protect a product from damage or contamination by micro-organisms and air, moisture and toxins.
- To keep the product together, to contain it (i.e. So that it does not spill).
- To identify the product.
- Protection during Transport and Ease of Transport.
- Stacking and Storage.
- Printed Information.

Packaging material

- Bamboo, Willow or straw baskets.
- Wooden boxes.
- Corrugated Cardboard (Fibreboard) boxes.
- Polythene plastic containers.
- Light-weight polythene plastic containers.

- Bag and nets.
- Linings or wrappers of paper or plastic film.

Advantage

1. Packaging protects the product.
2. Packaging keeps the product from going bad.
3. Packaging decreases costs.
4. Packaging informs.
5. Packaging provides hygiene.
6. Packaging means economy.
7. Packaging is a preventive measure.
8. In short; packaging is an inevitable part of our lives.

Disadvantages

However, packaging creates the following problems:

1. Packaging exhausts natural resources.
2. Packaging is too expensive.
3. Some forms of plastic packaging are health hazards.
4. Packaging is deceptive.
5. Used and discarded packaging contributes significantly to the consumer protection problem.

Points to be considered for Packaging of fruits and vegetables.

All the packaging of perishable is not quite satisfactory in Bangladesh but there are ample scopes to introduce and expand the use of improved packaging to reduce post harvest loss and maintain quality. The following points should be considered during Packaging of fruits and vegetables.

1. Improved packaging such as plastic crates (stackable and nestable), woven plastic sacks, plastic net bags and corrugated Fibreboard cartons should be used. The use of plastic crates increasing, especially for high value produce like mango and tomato.

2. Package should be strong so as to withstand repeated post harvest handling.
3. Package should not be very large or voluminous.
4. The package should not be overloaded and the produce should not be held too tightly or too loosely to minimise damage during transportation and handling.
5. Packages should have ventilation holes to allow aeration.
6. Different types of packaging accessories like cups, wraps, foam nets, liners and cushioning should be used to protect the produce during transportation and handling.
7. The packages should have label with farm logo and other relevant information for value addition and enhanced marketing.

Transportation

Definition: Fresh fruit and vegetables transportation is the act of bringing produce from growing region to areas of marketing and consumption.

Modes of transport/Present status of Transportation in Bangladesh

The following modes of transportation are used worldwide (including Bangladesh).

1. Overland road service.
2. Railway transport.
3. Inland river and Marine transport.
4. Air transport, on passenger and cargo planes.

1. Overland Road Transport

This transport system has increased very significantly over the world and now is the most dominant transport system due to several reasons.

In Bangladesh, Road Transport is done with open non refrigerated trucks. These are managed inadequately. The produce is loaded in ways which promotes major problems such as inadequate transport containers, inappropriate stacking, inadequate package, very rough loading methods, poor or non existing air circulation, heating and mechanical injury to the produce. This system must be changed if food losses are to be reduced. Non refrigerated transport must be improved by reducing the transported load improving the stacking system, avoid heating and mechanical damage to the produce. Refrigerated containers should be introduced in Bangladesh.

2. Railway Transport

This transport system can provide smooth ride, relatively inexpensive even though it is slower than other transport system and less versatile. However, this system of transport is declining significantly all over the world. Refrigerated and insulated Railway Wagons may be used for transportation of perishable produce.

3. Inland river and Marine Transport

River transport is commonly used in several countries especially in Asia. This system can be slow and it commonly non-refrigerated motorized country boat may be used for the transportation of the fresh horticultural crops. Marine transport of horticultural crops has increased significantly all over the world because of low cost compared to any Transport. This transport system is usually used for long distance and therefore it is not adequate for very perishable crops.

Bangladesh with its large rivers and water ways with access to the Bay of Bengal and with several port facilities has good potential to export perishable crops by sea. However, at the moment this alternative is not developed in the country.

4. Air Transport

Air transport is still mostly done on passenger airplanes with very little quantities of crops been carried on cargo planes. This system is relatively fast and therefore it is suitable for very perishable crops however its cost is still very high.

All exported horticultural crops from Bangladesh to Europe and the Gulf states are done by air. Perishable crops shipped from Bangladesh by air are very poorly handled. Most of these crops are not pre-cooled nor refrigerated before shipping and airport and planes do not provide any refrigeration system. Most of the packages used for these crops are inadequate and most of them are not even meant for perishable crops. Handling of these crops especially at the waiting points in Bangladesh and even at the reviving points at destination is not adequate at all for perishable foods.

Points to be considered during transport

1. Refrigerated capacity of the container should be adequate.
2. The vehicle and load should pre-cool before loading.
3. Good air circulation is required to maintain temperature uniformity to avoid the buildup of hot spots and the accumulation of gases such as carbon dioxide and ethylene.
4. Transport containers should not be overloaded to permit an adequate air circulation.
5. Stacking patterns and packages type and design should be adequate to permit an adequate air movement. Package design should be allowed in top, bottom, back and side of the load to permit air circulation.

Marketing

► The term marketing implies selling and buying of goods and services by the people. It include various functions such as ascending, transportation, storing, buying, selling, standardization, grading, processing etc.

► Marketing in the process through which goods and services changed between the producer and the consumers and their values are determined in terms of money price.

Characteristics of an ideal market

An ideal market has the following characteristics-

1. Produce is cleaned before it enters the market.
2. Different qualities of producer sold separately.
3. Produce is graded before sale.
4. Produce is sold by standard weights or in standard packages.
5. Produce is sold according to known greed upon prices in the market is transparent.
6. Storage facilities are available and are used if immediate sales have not been made.